



Travelers' Health

Traveler-based Genomic Surveillance for Early Detection of New SARS-CoV-2 Variants

Identifying and Tracking New Viral Variants Among International Travelers

Travelers are an important population to consider when tracking new and emerging infectious diseases. Travelers move from place to place quickly and can get and spread infectious diseases. U.S. airports are visited by more than 1 billion travelers each year and can serve as the front line for public health officials to detect [variants of SARS-CoV-2](#), the virus that causes COVID-19, in arriving international travelers. Learn more about [genomic surveillance for SARS-CoV-2](#).

The Traveler Genomic Surveillance program (TGS), run by the Travelers' Health Branch at CDC in partnership with Ginkgo Bioworks and XpresCheck, plays an important role in [U.S. national surveillance](#) by testing travelers to detect new variants entering the country and fill gaps in global surveillance.

In September 2021, during the Delta wave, the program began collecting samples from travelers arriving at three major U.S. international airports, John F. Kennedy in New York City, Newark Liberty, and San Francisco. In November 2021, in response to the emergence of the Omicron variant, TGS quickly scaled up by adding a fourth airport, Hartsfield-Jackson in Atlanta. Between 2022 and early 2023, the program expanded to three additional airports, Los Angeles, Seattle, and Washington, D.C.-Dulles. The program currently targets hundreds of flights per week from select countries representing all WHO regions.



TGS testing station located at Seattle-Tacoma International Airport.



TGS testing station located at D.C.'s Dulles International Airport.

As part of the TGS program, arriving international travelers volunteer to participate and provide nasal swabs that get batched into pools (5–25 swabs per pool) at the airport. These pooled samples are sent to Gingko's lab network for PCR (polymerase chain reaction) testing. All positives undergo genomic sequencing. Pooled sampling is a unique and valuable approach that allows the detection of multiple variants while conserving resources. Select samples from TGS are shared with CDC's lab for viral characterization which can help provide information on a variant's transmissibility, virulence, and response to current treatments or vaccines.

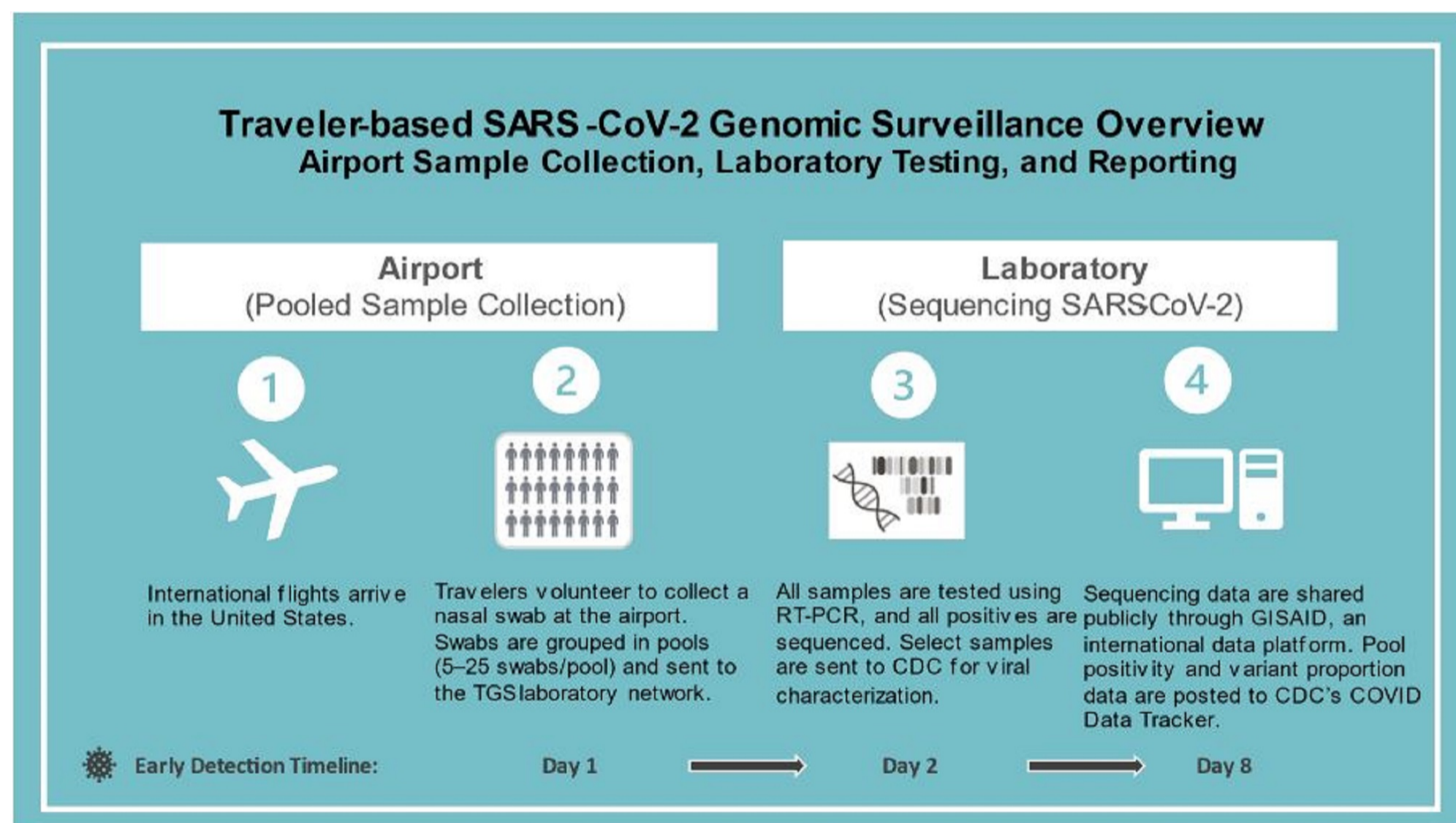
Informing Global Genomic Surveillance

During the initial weeks of the Omicron surge, TGS detected two Omicron subvariants, BA.2 and BA.3, and reported them to the global database, [GISAID](#) (Global Initiative on Sharing all Influenza Data), weeks before they were reported elsewhere, demonstrating that the program is able to detect variants early. Since those initial weeks, the program has continued to provide valuable information about variants coming into the United States.

Future program expansion plans are under way and include adding more airports and flights and collecting individual samples from each person participating in pooled sampling. These individual samples can be tested when more information about the source of a variant is needed. TGS has also started conducting aircraft lavatory wastewater surveillance, which can provide valuable information without directly involving travelers.

Any combination of detection strategies, from most active (individual sampling) to most passive (wastewater), can be used as an early warning indicator. Data from TGS also helps fill in gaps in global SARS-CoV-2 surveillance and can provide information on local circulating variants in countries that may have limited available sequencing data.

TGS is a model of pathogen detection that can be used as an early warning system for the detection of many pathogens beyond SARS-CoV-2.



TGS Program at a Glance



Program Participation

>110,000 voluntary participants from November 2021–February 2023



Testing Sites

7 U.S. airports: Atlanta, Los Angeles, Newark, New York-JFK, San Francisco, Seattle, and Washington, D.C.-Dulles



Countries and Flights Monitoring

30 countries across Africa, Asia, Europe, Middle East, and South and Central America



Testing Volume

>12,000 pooled tests November 2021–February 2023



Sequencing

>2,700 positive pools were sequenced November 2021–February 2023; select samples shared with CDC lab for viral characterization



Bioinformatics

In 2021, TGS detected BA.2 and BA.3 sub-lineages one and six weeks before they were reported in the United States and North America, respectively.

Recently, the program was among the first globally to identify BQ.1.1 and contributed towards its designation as a sub-lineage. TGS also has been among the first to identify and report BA.2.75.2, XBB, and CH.1.1 in the United States.

TGS Media and Publications

- [CDC launches Traveler-Based SARS-CoV-2 Genomic Surveillance Program](#)
- [Early Detection of Severe Acute Respiratory Syndrome Coronavirus 2 Variants Using Traveler-based Genomic Surveillance at 4 US Airports, September 2021–January 2022](#) [↗](#)
- [A CDC airport surveillance program found the earliest known U.S. cases of Omicron subvariants](#) [↗](#)
- [How an Airport Nail Salon Became the Frontline of U.S. Covid Surveillance](#) [↗](#)

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